Penn State Engineering Conferences

Wastewater Biology
March 9-10, Memphis, TN
April 6-7, Toledo, OH
June 15-16, Atlantic City, NJ
December, University Park, PA
Michael Gerardi

This three-module, short course series, coordinated by the Penn State Facilities Engineering Institute, covers current topics relevant to facility management and operation. Participants may elect to take one or several of the modules. The modules, and the dates they will be offered are:
— Project Planning: March 30-April 1
— Managing Utility Systems: April 27-29
— Facilities Maintenance: June 15-17

Manufacturing Technology Showcase
May 1, University Park
Dr. Ravi Ravindran

Faculty from the Industrial and Manufacturing Engineering Department will present and discuss the latest developments in manufacturing technology. Areas covered will include: Materials Processing, Human Factors, Manufacturing Systems, and Automation. The program features a keynote address by an industry expert and an opportunity for discussion and networking. Alumni will find this an excellent opportunity to update their knowledge and to renew their links to the department.

Modern Protective Structures
May 5-9, University Park
Dr. Theodor Krauthammer

This course, by internationally-renowned experts in the field, will give engineers, architects, and safety and security managers fundamental background information and relate it to the performance and latest design requirements for hardened facilities.

Modern Bearing Technology Overview for Management
Date to be announced, University Park
Dr. Tedric Harris

Presented in conjunction with the American Bearing Manufacturers Association, this course provides managers with an overview of bearing types and their manufacture, application, lubrication, and testing. The course wraps up with a brief discussion of likely future developments.

HEC-RAS River Analysis Program
May 18-22, University Park
Dr. Arthur Miller

Participants will learn the theory and application of the HEC-RAS river flow analysis computer program. Lectures will be supplemented with hands-on exercises in the computer laboratory.

Computational Methods in Stormwater Management
June 14-17, University Park
July 27-29, University Park
Dr. Thomas Seybert

This short course is intended for engineers and planners who want to upgrade their skills in microcomputer methods for hydrologic analysis and hydraulic design of stormwater facilities. Topics covered represent a comprehensive array of tools for stormwater management planning, detention facility design, and subdivision planning.

Physical Plant Operation and Maintenance Series
July 13 to August 5 at University Park
James Myers

This series, for facility managers, engineers, and maintenance personnel, consists of four, three-day modules. Participants may elect to take one or several of the modules. The modules, in order of their presentation, are:
— Electrical Systems and Maintenance
— Boiler/HVAC Water Treatment
— Central Boiler Plant Operation
— Air Conditioning Maintenance and Repair

Corrosion Short Course
July 26-31, University Park
Dr. Barbara Shaw

Co-sponsored by the College of Earth and Mineral Sciences, the Penn State Corrosion Center, Gamry Instruments, and Mineral Sciences, the Penn State Corrosion Short Course will provide an in-depth exploration of the fundamentals of corrosion and corrosion prevention. The course is designed for engineers, scientists, and other professionals who work with materials in contact with aqueous environments. The course will cover the fundamental principles of corrosion and corrosion prevention, as well as practical applications and case studies.

Rotary Wing Technology
August 10-14, University Park
Dr. Barnes McCormick

This course, designed for engineers, presents a comprehensive introduction to rotor craft technology. The lectures, well-recognized in their respective disciplines, will cover a range of major topics including: Aerodynamics, Dynamics, Stability and Control, Acoustics, and Structural Design.

Registration

To register by phone or to request a conference brochure and registration form, call 1-800-PSU-TODAY (1-800-778-8632).

Note: Preregistration is encouraged because the University may cancel or postpone any course or activity due to low enrollment or other unforeseen reasons.

Additional information about these and other engineering conferences can be found on the World Wide Web at the College’s Continuing Education Web site: http://www.engr.psu.edu/

You may also contact Engineering Continuing Education directly at: Phone: (814) 865-7643
Fax: (814) 865-3969
E-mail: bjrl10@psu.edu
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National resource center established— for ultrasonic transducer research

Researchers at Penn State have received a $3.5 million grant from the National Institutes of Health (NIH) to establish the nation’s only resource center for the development of ultrasonic transducer/array technology for medical diagnostic procedures. This technology is used in the probes doctors hold against a patient during an ultrasound scan.

Ultrasonic transducers/arrays transform electricity into ultrasound waves, and vice versa, so that the returned ultrasound echoes from structures in the human body can be used to obtain internal diagnostic information from patients, much like x-rays or CAT scans. Improving these devices will permit better image quality, leading to improved diagnosis for medical conditions such as cardiovascular disease, birth defects, and tumors.

Penn State researchers from across the University are combining forces to focus on two areas: First, developing ultrasonic transducers/arrays in the very high frequency range, beyond 30 MHz, which will be used in ophthalmology, dermatology, and vascular surgery to see finer details than is now possible. Second, utilizing new and more efficient materials which will create better clinical images.

“Ultrasonic imaging is one of the most important medical imaging methods today,” says K. Kirk Shung, professor of bioengineering and principal investigator for the grant. “It possesses several advantages over other techniques, like x-rays or magnetic resonance imaging (MRI), including being noninvasive, relatively inexpensive, portable, and capable of producing a tomographical image—an image of a two-dimensional slice of the body. Another very important advantage is that ultrasound produces images fast enough to monitor the motion of structures within the body, such as a fetus or a beating heart.”

“Most engineers have an incomplete understanding of ultrasonic transducer performance, because it requires such a broad interdisciplinary knowledge,” says Shung. “The four-year grant from NIH builds on an earlier Whitaker Foundation grant which established the interdisciplinary Whitaker Center for Medical Ultrasonic Transducer Engineering at Penn State in 1994. We anticipate much improvement to this technology to be made with our new funding.”

According to Shung, limiting factors to improving ultrasound transducer/array technology are the critical national shortage of engineers knowledgeable in this subject, and the lack of R&D sites. Using the Whitaker grant, Penn State established a graduate program in bioengineering with an emphasis on ultrasound transducer technology, and six students recently graduated from this program—two with Ph.D. and four with M.S. degrees.

Now the NIH funding will provide Penn State researchers the resources to focus on needed R&D as a service for academic institutions and commercial companies. Research is underway for eight clients at this time, and an advisory board is in place to select the projects for future development.

Penn State was chosen as a site for this national resource center because the interdisciplinary expertise and infrastructure needed to pursue the research existed here through Hershey Medical Center, the Applied Research Laboratory (ARL), the Intercollege Materials Research Laboratory, and the College of Engineering’s bioengineering and acoustic programs.

Co-investigators in the NIH national resource center are from the Hershey Medical Center Drs. J on W. Meilstrup (assistant professor of radiology), Diane M. Thiboutot (associate professor of dermatology), George Rosenwasser (associate professor of ophthalmology), and Randy M. Hauck (assistant professor of surgery); from the Intercollege Materials Research Laboratory, Thomas R. Shrou t (senior scientist and professor of materials) and Wenwu Cao (associate professor of math and materials research); and from the Applied Research Laboratory W. Jack Hughes (senior research associate and associate professor of acoustics), Richard L. Tutwiler (research associate), and Grant A. Gordon (research associate in engineering science).

The resource center is staffed by two experienced transducer engineers, Tim Ritter and Pat Lopath, and three post docs.

Additional information on ultrasonic transducer research at Penn State can be found on the Web at http://bioeng.psu.edu/NIH_transducer.html.

Contact Dr. Shung at (814) 865-1407 or by e-mail at kksbio@engr.psu.edu.
Rolling, rolling, rolling

For drivers, nothing is more joyful than cruising along a smooth, brand-new stretch of road. But making sure the roadway surface can handle the stresses of traffic and the environment has always been a challenge to contractors. Ensuring proper compaction of roadway materials as they build new roads is an ongoing concern for construction crews.

“If you don’t roll over the road enough times, you get low density. If you roll over it too many times, you further crush the aggregates, again causing low density,” said Amr A. Oloufa, an assistant professor of architectural engineering. Oloufa said a lack of proper density may cause potholes, create lower speed limits, or even shut down a road completely.

The problem that has plagued contractors is that no accurate method exists to make sure a road has the proper compaction throughout. Inspectors can check compaction using nuclear guages, but on the average, only one sample is drawn for every 1,000 feet of road and that method requires special training.

“A lot of money is spent to make sure it’s done right,” said Randolph Thomas, professor of civil engineering. “Despite the money that’s spent, contractors still don’t know for sure it’s done right.”

But a research project started three years ago by Oloufa and Thomas may change all that. The project, a collaboration with David C. Swanson, a research associate at the Applied Research Lab, and sponsored by Ingersoll-Rand and the Ben Franklin Partnership, uses the Global Positioning System (GPS) to monitor compaction on a road surface.

Using the signals from these orbiting satellites and a GPS receiver, a person can pinpoint his location anywhere on the planet.

The researchers devised specialized software that processes GPS data and gives compactor operators real-time information as they roll over roadways. Using standard GPS equipment mounted on the compactor, information about the position of the moving compactor is relayed to a computer that translates the data into color codes. The color codes correspond to the compactor’s position and changes in color denote how many passes the machine has made. The information is relayed to a computer screen for the compactor driver, who can make crucial real-time adjustments as he works on the road.

“As you’re driving the compactor, it tells you if you’re on the right spot or not, or if it’s compact enough,” Oloufa said.

The team spent much time in the field gathering data for vibrations, positioning, and other operating variables. When the project is completed, an integrated system of sensors for positioning, temperature, humidity, and vibration will be developed.

Keeping an eye on costs, the researchers turned to off-the-shelf equipment and sensors to create their system. Outfitting a compactor with the researchers’ GPS setup will cost less than $9,000.

“A compactor costs $100,000,” he said. “So you can’t put $85,000 of equipment on it and expect it to sell.”

Oloufa said the team hopes to have the system available for commercial use by late this year.

Dr. Oloufa can be reached at (814) 863-2080 or by e-mail at aao1@psu.edu.

—Curtis Chan
A new acoustic device to inspect pipes

Penn State engineers have developed a new inspection device that uses sound waves to detect and measure corrosion and wall thinning in virtually any insulated or non-insulated pipe, from the Alaskan pipeline to your own home’s water, gas, or sewer lines.

The device, which is being patented, can inspect forty feet of pipe or more at one time without being moved and offers 100 percent cross-sectional coverage. It can also inspect water-filled and immersed pipes as well as work through welds, and around bends, elbows, and corners with little loss in sensitivity.

Insulated pipes can be prepared for inspection with the new device by removing only a small band of insulation about every forty feet. Field tests conducted on piping under insulation in both a laboratory and a chemical processing facility show that the device can detect corrosion and measure wall thickness across a wide range of pipe sizes and insulation types.

Joseph L. Rose, the Paul Morrow Professor in Design and Manufacturing in the College of Engineering, developed the device. He says it is an ideal screening tool to quickly identify the sections of piping that need further point-by-point examination.

In the new device, Rose has selected a pipe comb system, instead of a more standard angle beam probe design.

In the pipe comb system, the sender and receiver are incorporated in a series of thin plates spaced like the teeth on a comb. The pipe comb system can either be wrapped around the pipe or, in the case of very large diameter pipes, can simply be laid on the top. Even though the device lays only on the top of the pipe, it can still inspect the bottom at a length at least 40 feet downstream.

Research on the new pipe comb device was supported in part by a grant from the Electric Power Research Institute. The patent on the device is assigned to Penn State and the invention is available for licensing. Rose has described the device most recently in a paper, Ultrasonic Guided Wave NDE for Piping, in the journal Materials Evaluation.

Joe Rose demonstrates the ultrasound inspection device to screen pipes for corrosion or damage.

Dr. Rose can be reached at (814) 863-8026 or JLRESM@engr.psu.edu by email.

—Barbara Hale

Breazeale facility gets updated

In the past year, numerous changes to enhance the abilities and utility of Penn State’s Radiation Science and Engineering Center facility, including the Breazeale Nuclear Reactor were implemented.

“As part of our work, we irradiate electronic materials and devices to alter their structure or to test their resistance to change by a variety of radiations,” says Candace Davison, senior reactor operator. “We have installed a larger diameter tube for this process, and can now irradiate larger semiconductor wafers. We also installed a new system to do neutron radiography that enhances our imaging capabilities.”

The equipment for neutron activation analysis was reconfigured during the summer as well. This is used by researchers in fields as diverse as anthropology and geology to determine the composition of a variety of materials.

A new irradiation device to allow more flexibility was added to Center’s gamma irradiation laboratory, which uses cobalt as a gamma source in a wide variety of experiments. This laboratory has helped create new variations of African violets and poinsettias, contributed to our understanding of genetic changes through fruit fly studies, and is used to sterilize materials that cannot be subjected to high temperatures.

One entirely new installation still under construction at the Radiation Center, is the Thermal Hydraulic Test Loop. This three-story tower of glass pipes and devices will allow researchers to simulate portions of a simplified boiling water reactor.

“We have been busy over the past three years;” says Davison, who is also research and education specialist. “Research use of the reactor seem to be increasing at a steady rate, while the training of nuclear engineers and other students continues as always.”

Ms. Davison may be reached at (814) 865-6351. Dr. Frederick Sears, director, may be reached at (814) 865-6351.

—A’ndrea Elyse Messer
What would happen if...?

One day in January 1995 while Jogender Singh was making carrot juice in a blender for his wife, his mind whirled ahead on its own, as engineers’ minds have a way of doing.

He found himself wondering, “What would happen if a laser was interacting with the liquid in the blender instead of the carrot?” He realized that no one had explored this area, and it might present new opportunities.

Singh modified an ordinary kitchen blender and began experimenting in Penn State’s Applied Research Lab (ARL) with laser energy on a silver nitrate solution. When the clear solution turned coffee-brown right away, he knew something had happened. Over the next eighteen months, his research team examined the results, explored its possibilities, perfected their technique, and designed a stainless steel reactor (shown on front cover) to replace the blender. Along the way, they saved nanoparticle dust from different solutions and tests in rows and rows of vials in their lab.

What Singh and his researchers have developed is a faster, cheaper, and cleaner method of producing the tiny

Continued on next page
pieces of metal called nanoparticles. Individual nanoparticles are smaller than the smallest bacteria or about the size of a small virus, in the invisible 1 to 100 nanometer range. (A nanometer is equal to one-billionth of a meter.)

Ultrafine metal powders, such as the dust made of silver nanoparticles, are used today in solder, dental fillings, circuit boards, high-speed photographic film and a host of other applications. There has been growing interest in improving the production of these nanoparticles, both to reduce cost and refine the technology. For instance, if the tiny metal particles in medical adhesive paste (which is used to stick electrodes onto skin) were even smaller than they are now, they would produce a more accurate transmission of information about a patient’s heartbeat.

Jogender Singh holds a joint appointment as a senior research associate at ARL, as associate professor of materials science and engineering, in the College of Earth and Mineral Sciences, and as associate professor of engineering science and mechanics in the College of Engineering. He led development of the process along with co-inventors and ARL engineers, Paul Denney and Eric Whitney.

Researchers have been interested in, and developing nanoparticles of metal for about five years, but making them has been very difficult or expensive. The current processes include mechanical milling, chemical precipitation, thermal spray, spray pyrolysis, and laser ablation processes, each of which has disadvantages.

For instance, when making silver nanoparticles, the precipitate process is controlled by the addition of the chemical hydrazine, an expensive, carcinogenic, and hazardous compound. Other processes require a vacuum which slows the production, and still others, such as mechanical milling, cannot make particles as small as needed.

In Singh’s new method for making metal nanoparticles, the laser energy and wavelength, the solution components or concentration, and the rotation speed all can be varied to control the production and particle size. Dangerous chemicals like hydrazine are unnecessary, thus reducing the cost and greatly improving the safety of production. Production is much faster than with current technology, since a vacuum is not needed. Singh notes that the new process can produce a host of nanoparticles such as silver and nickel at a rate of 0.5 to 3 grams per minute, as compared with 2 to 3 grams per hour for conventional processes.

How the new process works

Singh’s process of laser-liquid-solid interaction (LLSI) synthesis of nanoparticles was originally developed for silver and nickel. Using a household blender, a laser and inexpensive reaction materials, he showed that he could produce an ultrafine silver powder that is purer, more uniform, and 100 times finer than any now on the market.

Singh makes the silver powder by flowing silver nitrate, an inexpensive, colorless liquid used in pharmaceuticals, photography, and dyes, through a blender with a reducing agent at room temperature. In the blender is a disk, or solid substrate, which rotates in the solution as the mixture is irradiated with bursts from the laser. As laser energy hits the turning disk, it creates a tiny “hot spot” in the liquid where the silver nitrate and reducing agent can react. The result is a tiny particle of silver. After the silver nitrate solution flows out of the blender, the particles are separated out with a centrifuge and collected.
process could potentially be used to produce new materials which cannot be produced economically by any conventional process. For instance, it is very difficult to make an alloy of silver and nickel which are completely immiscible in the liquid and solid state. Singh’s group successfully produced non-equilibrium silver-nickel alloys, which are needed in the micro-electronic industry.

**For the future**

“This new technique is significant for several reasons,” says Singh, as his excitement at the unknown potential for new materials, methods, or products from the LLSI process shines from his eyes and face.

“Take nanotubes, for instance, they are in an infant stage of development,” he says. “Two or three years ago researchers started focusing on these tiny hollow particles, but no one knows for sure what all the potential uses for them will be. It’s thought they’ll be useful in microelectronics, medicine, and perhaps, in high temperature materials. What if we could trap a gas in a nanotube, what could we do with that?”

“The LLSI process is inexpensive and easy to handle,” he adds. “This is another reason the technique is exciting. With about $100,000 invested in equipment including the laser, anyone could manufacture these powders, and the demand for them is very high and growing. The new technique will eliminate the ‘captive market’ that exists today in nanoparticle production.”

“Finally, this process is exciting because we don’t know yet what we’ll be able to do with it. We’ve never had such control before over the production of nanoparticles. We’re just beginning to discover what can be done. Who knows where this will lead? The potential is unknown and unlimited. What would happen if...?”

Contact Dr. Singh at (814) 863-9898 or e-mail to jxs46@psu.edu.

—Lani Bloomer

**Additional applications**

Singh and his group have also shown that the new process can substitute for electroplating in some applications by depositing coatings in patterns on metal surfaces. By slowing the rotation speed and focusing the laser on a metal plate bathed in the reaction solution, the technique can successfully deposit silver or nickel in any desired pattern. The process could potentially be used to fabricate circuit boards or other super small microelectronics, and would be useful for creating very small custom circuit boards quickly and economically.

Extracting waste silver from spent photographic solutions is another possible application for the LLSI process. Singh notes that the reaction materials used in the new process are environmentally friendly, and hydrazine, which is currently used to reclaim waste silver commercially is not needed.

In the future, he expects to be able to use the process to produce carbon nanotubes, the invisible carbon wires recently discovered by others, that have stirred so much interest in the microelectronics industry. While Singh has been successful at producing carbon nanotubes with the LLSI technique, their production rate has been limited and uneconomical to date.

The LLSI technique is so friendly that the process can be used to engineer new materials which cannot be produced economically by any conventional method. The process is being patented and is available for licensing. Singh has published several articles on the work, most recently, “Nanoparticle Synthesis By A Novel Laser-Liquid-Solid Interaction Technique” in the Proceedings of the International Conference on Recent Advances in Metallurgical Process (Bangalore, India). His report, “A Novel Technique in Synthesis of Silver Nanoparticles By Laser-Liquid Interaction,” will be published in the Journal of Materials Science early in 1998.

**The Best of the High Tech!**

In September 1997, Jogender Singh was honored with an R&D Magazine 100 Award which recognizes 100 of the best new discoveries or inventions of the year. He is the only Penn Stater who has been honored with this award. Now in its 35th year, this annual competition selects one hundred new products, processes, or materials from around the world which they judge to be the most significant technological advances of the year.

The R&D 100 Awards have been called the “Nobel Prizes of applied research,” and former products selected for this honor have included ATM machines, Kodak’s Polaroid film, antilock brakes, the anti-cancer drug taxol, halogen lamps, and the fax machine.

In November 1997, Singh was named a Fellow of the American Association for the Advancement of Science.
New minor makes major difference for engineering students

For students in the College’s Engineering Leadership Development Minor (ELDM), it’s not just another day in the classroom.

The program’s students have the unique opportunity not only to learn about leadership, but to enhance those leadership skills further through a student organization.

“The student organization is structured like a corporation,” said Andrea Joyce, a mechanical engineering senior. “We wanted to find out how it was like to be in a corporation and provide a service to someone—the students.”

That “corporation” became Engineering Leadership Development Unlimited (ELDU), an organization recognized by the University’s Undergraduate Student Government in spring 1997. ELDU, which serves as the extracurricular component to the minor, focuses on promoting and nurturing the program. To do this, the organization is structured into seven committees, each run by a student vice president. The vice presidents report to a single student president for ELDU.

Joyce, who served as vice president for the developmental relations committee, said the group has accomplished a great deal in improving and promoting the minor in such a short time. She said the students created a teaching intern’s position to help Jeff Soper, the program’s director, get more feedback from students. The group has also organized events, including open houses, workshops, and a trust walk where ELDU’s officers lead blindfolded students from class to the group’s office.
Although students in the minor are not required to participate in ELDU, about half the minor’s students take an active role in the organization, said Jason Spiegler, ELDU’s president.

The idea for the minor developed from talks between the Electrical Engineering Department and the Leonhard Center for the Enhancement of Engineering Education, with some input from industry, said Larry Burton, head of the department. ELDM is jointly funded by the Leonhard Center and electrical engineering and is administered through the Electrical Engineering Department. The minor also receives some funding from companies such as Anderson Consulting and Telecommunications Techniques Corporation.

“The program is intended to give students those non-technical attributes needed for leadership in industry that aren’t in the normal curriculum,” Burton said. He said about fifty students are enrolled in the minor and the program’s first four students graduated at the end of the fall 1997 semester.

“There isn’t a text. Students learn through activities,” Soper said about the minor’s coursework. He said the minor tries to teach engineering students, who are used to thinking in terms of black and white and right and wrong, that the real world doesn’t work that way. “It’s group work where, ‘Here’s a situation, deal with it.’ There isn’t any one right answer to these problems. Everything isn’t clear cut.”

The minor allows students to explore topics not usually found in engineering curricula, such as entrepreneurship, leadership styles and development, public policy, and ethics.

“Most minors deal with a major or supplement a major you’re already in,” said Alexis Demangone, a junior in industrial engineering. “But with this program, it’s almost like an engineering student minoring in business.”

Learning by doing

For example, in EE 409, Leadership in Organizations, students assumed the role of investment consultants. Each student group chose and examined a different industry—one examined the fast-food industry, another investigated microprocessor manufacturers, and yet another checked out makers of sunglasses. For selected companies in the teams’ industries, they probed the firm’s marketing strategy and corporate strategy and did a financial analysis. Each group then presented the results of their studies to the rest of the class, along with a recommendation for which firm to invest in.

For each team, the learning process didn’t end with the presentation. Immediate feedback came from students and the instructor. Students in the class asked direct questions of the presenters and offered counter arguments to their recommendations. Soper, the instructor for the class, asked questions and pointed out flaws in the presentation, such as a presenter not looking at the audience, fidgeting, or saying “uh” too often.

“The first time it happened, I thought I did a horrible job with my presentation and I was upset,” recalled Lauren Farley, an electrical engineering senior. “We all expected there would be questions, but until you get up there, you don’t know how it will be. People will ask you questions you never thought of. It’s nerve racking, but it’s beneficial. In normal engineering classes, you don’t come under fire for a circuit you designed.”

The bottom line

Job recruiters said that the minor could give Penn State’s engineering students an advantage when employers are recruiting. “Our biggest challenge is finding the technically-competent people who are leaders, are self-motivated, and can work in teams,” said Bob Fye, a technical sales representative and recruiter for Texas Instruments. “Ninety-five percent of our interview questions are geared toward learning about a candidate’s non-technical skills.”

Fye said he and other recruiters from Texas Instruments have had to reject candidates because they lack the necessary non-technical skills.

“There are a lot of people with 3.0s, and we may extend offers to a quarter of them,” he said. “Our top concerns are: one, the ability to work in a team, and two, leadership skills.”

Tom Kuhn, an electrical engineering student, is one of the first four students to complete the minor. Kuhn already agreed to take a job in technical sales with Telecommunications Techniques Corporation before graduating.

“I don’t have a particularly high GPA,” Kuhn said. “But on my resume, I had this program and some of its attributes, and that piqued their interest.

“The minor has rounded out the engineering skills with the essential non-technical skills. It gave me the confidence to know I can make things happen.”

Dr. Soper can be reached at (814) 865-4017 or by e-mail at jgs7@psu.edu. Information about the Engineering Leadership Development Minor can be found on the Internet at http://www.eec.psu.edu/eldm/

—Curtis Chan
A tide of change is flowing through engineering education at Penn State, reflecting the restructuring and refocusing that is taking place in the engineering industry. The days are gone when engineering students spent their first three or four semesters without any engineering courses and their learning environment was shaped by listening to lectures and studying alone.

The faculty recently approved ambitious new curricular and learning strategies at both the College and University levels—initiatives which will significantly change the undergraduate teaching and learning environment here. The goal is to prepare students for a workplace that values innovation, features an integrated systems approach, and increasingly requires global communication and cooperation.

In the College of Engineering, these changes will stimulate expanded partnerships with industry, integrate theory and practice in engineering courses, and create more collaborative and interdisciplinary courses.

A changing profession means changing curricula
What is driving these broad changes in the engineering curricula? After all, engineering education has remained relatively constant for decades—except for adapting to technological advances.

The College’s Industrial and Professional Advisory Committee (IPAC) and our students’ potential employers continue to stress the need for strengthening interpersonal and communication skills among graduates.

A national decline in applicants to engineering schools (though Penn State’s engineering applicants have not decreased) and an interest in encouraging women and minorities into the profession over the last decade, have increased the competition for diverse and talented students.

Today’s rapidly evolving, global workplace and diverse workforce requires changes in preparation for our graduates—and an appreciation of the need for lifelong learning—to have successful professional careers.

An expectation that graduates will be able to work across traditional boundaries calls for a more integrated curriculum and teaming of engineering students with those from business or social/humanistic fields.

In response to these pressures for change, the criteria for accrediting engineering programs, developed by the Accreditation Board for Engineering and Technology (ABET), have also undergone substantial reform. ABET’s new Engineering Criteria 2000 proposal shifts the emphasis from conformance with universal curricular elements, to a new era of improvement and innovation in engineering education.

Where we are today
Fortunately, Penn State Engineering was an early leader in this environment of educational change and assessment-driven reform. Input from student and alumni focus groups, surveys of employers and recent graduates, and dialogue with our industrial and professional advisory boards identified the strengths and opportunities for improvement of our programs. These assessments have targeted issues that constitute a fertile basis for re-engineering the learning environment:
Our program must maintain a rigorous technical grounding, including knowledge of mathematics, science, and engineering.

Students should develop stronger written and oral communication skills.

Students should learn to function in an interdisciplinary, collaborative environment. They need to learn good interpersonal skills, to work effectively in teams, and to manage project and human resources.

The educational experience must offer significant opportunity for practical application, problem solving, and open-ended design. This includes a rich exposure to ethical considerations, societal and global issues, and the business and economic issues inherent to the profession.

These topics or outcomes clearly represent a considerable educational challenge, and one that cannot be successfully achieved by academia alone.

Four major and very successful accomplishments, which involve faculty-student-industry collaborations, strongly point to such partnerships as the mechanism best suited to accomplishing these goals.

The privately endowed Leonhard Center for Enhancement of Engineering Education has incubated a successful model for leadership training in the College’s new academic minor in Engineering Leadership Development (see story on page 10).

The “First-year Design Experience” (developed under NSF Coalition funding to replace the conventional engineering graphics curriculum) features carefully-articulated core competencies and a student design competition framed and judged by industry volunteers and sponsors. For additional information, see Web site http://www.ecsel.psu.edu/setce/edg100/

Current developments
In the aggressive restructuring of the University’s general education curriculum, first-year seminars which emphasize active learning (typical at small colleges) will be established for all students entering Penn State. This University focus on active learning is being echoed at the College level in the following initiatives adopted in November 1997, by the Engineering Faculty Council:

- First-year seminars are being designed for engineering majors to emphasize hands-on activities, contemporary topics, and targeted skills development. With substantial contributions from practicing engineers in these seminars, our incoming students’ interaction and identification with their intended majors will be established during their first year.

- Existing courses are being redesigned to take advantage of new technology. Students will spend more class time engaged in supervised computer simulation and team activities. Outside of class they will work together in study groups, submit their assignments collaboratively, and interact with their professors anytime and from anywhere via e-mail and the Internet.

- Technical courses are being creatively linked to, or clustered with non-technical courses in order to provide our students with a clearer understanding of the relevance of the non-technical subjects. For instance, last summer incoming engineering students were offered English composition in conjunction with their engineering design and graphics course. Another example might include linking a manufacturing course with one on technical policy, or environmental or legal issues.

Evaluation is part of the process
The College is now developing measurable curricular objectives and identifying ways to evaluate these educational changes. Not only is this evaluation process needed to meet ABET’s EC 2000, but our IPAC advisers are interested in the program’s assessment process as well. We look forward to the continuing input and participation of our alumni and industrial partners as we work on these exciting developments and continue improving engineering education.

Contact Dr. Pangborn at (814) 863-3570 or by e-mail at rnpdo@engr.psu.edu.

— Rob Pangborn, associate dean for undergraduate studies
Five new department heads join College

Five new department heads have joined the College of Engineering this fall, bringing fresh direction to their departments. Three former department heads have assumed dean’s positions at other universities, while a fourth has retired and the fifth returned to full-time teaching.

Architectural Engineering

Richard A. Behr, professor of architectural engineering, is the new head of the Department of Architectural Engineering. “I intend to work closely with our external customers, the employers of our graduates, to maintain and enhance the department’s current leadership position in undergraduate education.”

Behr was formerly a civil engineering faculty member at the University of Missouri-Rolla, and a senior research investigator at their Graduate Center for Materials Research. His research interests include the structural performance and durability of building envelope systems under severe windstorm, earthquake, and accelerated weathering effects. He received his B.S. and M.S. in civil engineering from Carnegie Mellon and his Ph.D. in CE from Texas Tech.

Paul Seaburg, who had served as head of this department for eleven years, is now associate dean of the College of Engineering and Technology at the University of Nebraska-Lincoln.

Civil and Environmental Engineering

Paul Jovanis has been appointed professor and head of the Department of Civil and Environmental Engineering. He comes from the University of California, Davis, where he was a professor and chair of the Civil and Environmental Engineering Department, and associate director of the Institute of Transportation Studies.

“I was attracted to Penn State by the tremendous amount of positive energy here on the part of the students and faculty. I believe that students are our most important product and I look forward to the challenges of directing our department to reflect that philosophy.”

His research focuses on intelligent transportation systems, transportation system safety, and transportation system operations. He holds a B.E. in electrical engineering from the Stevens Institute of Technology, an M.S. in civil engineering from the University of Maryland, and a Ph.D. from the University of California, Berkeley.

Former department head, Chin Kuo, has become Dean of the College of Engineering at Wayne State University in Detroit, Michigan.

Computer Science & Engineering

Before becoming the new CSE head, Dale Miller served on the faculty at the University of Pennsylvania’s Computer and Information Science Department.

“My goals for our young department are to strengthen and broaden the research and graduate programs. We plan to develop the interdisciplinary orientation of the department by fostering more links across the University, and to address the huge demand for our undergraduate programs. With the information revolution touching all aspects of our lives, this is an exciting time to be an academic working in computing and a time of many opportunities for our department.”

Miller’s research includes symbolic logic, the theory of proofs, and the design and analysis of computer programming languages and software systems. He holds a B.S. in mathematics from Lebanon Valley College and a Ph.D. from Carnegie Mellon University.

Former head, Joseph M. Lambert, associate professor of Computer Science and Engineering, and Mathematics has returned to full-time teaching.

Industrial & Manufacturing Engineering

A. Ravi Ravindran has been appointed professor of industrial engineering and the new head of this department. Ravindran came from the University of Oklahoma where he was a professor of industrial engineering and director of the Center for the Study of Wireless Electromagnetic Compatibility.

“The quality and commitment to excellence here attracted me to Penn State. With the unique opportunity provided by the College’s new Leonhard Building and the enthusiasm and dedication of the faculty and staff, we plan to make the department an international leader in the next century.”

Ravindran’s research interests are electromagnetic compatibility of cellular phones with medical devices, goal programming, interactive methods for multiple criteria optimization, applications of mathematical programming to health planning, quality control, flexible manufacturing systems, transportation networks, hazardous waste disposal, and system reliability. He received his B.S. in electrical engineering from Birla Institute of Technology and Sciences, and his M.S. and Ph.D. in industrial engineering from the University of California, Berkeley.

Allen L. Soyster is now Dean of the College of Engineering at Northeast-
ern University in Massachusetts. He served as IE department head from 1981 to 1996.

Graduate Program in Acoustics

Anthony Atchley has been appointed head of the Graduate Program in Acoustics and professor of acoustics. Atchley previously served as a professor and chair of the Department of Physics at the Naval Postgraduate School.

“I think the program’s strength is its diversity, in both its people and the research it covers. We are going to increase diversity in the program’s students and recruit faculty who are experts in areas the program does not cover.”

Atchley’s research interests include thermoacoustic heat transport, finite amplitude acoustics, sonoluminescence, and physical acoustics. He received his B.A. in physics from the University of the South, his M.S. from the New Mexico Institute of Mining and Technology, and his Ph.D. from the University of Mississippi.

Professor emeritus, Jiri Tichy, former acoustics program head, retired on June 30, 1997. He remains a consultant with ARL and continues to work with students. He had served as head of the program since 1975.

New associate dean for graduate studies and research

John M. Mason Jr., professor of civil engineering, has been appointed associate dean for Graduate Studies and Research.

Mason’s goals include fostering interdisciplinary research and graduate studies, finding new ways to fund research and development, continuing to attract the best graduate students, promoting diversity, and reviewing graduate fellowship procedures.

“We must make sure we provide meaningful, quality service to the faculty and graduate students in our College. The role of this office will be to enhance the interaction among faculty, graduate students, and research sponsors,” he said.

Before becoming the associate dean, Mason was associate director of the Pennsylvania Transportation Institute and director of the Center for Intelligent Transportation Systems. He earned his B.S. from Penn State, his M.S. from Villanova, and his Ph.D. from Texas A&M. Mason has worked as an engineer since 1972, and has been at Penn State since 1987.

The author and co-author of numerous publications, Mason has received several honors, including the 1984 Collingwood Prize from the American Society of Civil Engineers (ASCE), the 1990 Villanova University Carl T. Humphrey Memorial Award for professional achievement in engineering, and outstanding paper awards from the Institute of Transportation Engineers, the Transportation Research Board, and ASCE.

Mason replaced Michael M. Reischman, who accepted a position at the University of South Carolina.

Dr. Mason can be reached at (814) 865-4542 or by e-mail at jmm7@psu.edu.

New PI for ECSEL Initiative

John D. Mitchell, professor of electrical engineering and a faculty member since 1980, has been appointed principle investigator for the Engineering Coalition of Schools for Excellence in Education and Leadership (ECSEL) at Penn State.

ECSEL is a coalition of seven schools and colleges of engineering committed to renewing undergraduate engineering education and its infrastructure. Funding for the coalition comes from the National Science Foundation at $3 million per year, and was renewed by the NSF for a second five years in 1995.

Since its creation at Penn State in 1990, the coalition’s accomplishments include revising the first-year engineering course and its adaptation to all campuses, vertically integrating the sail plane curriculum in aerospace engineering and case studies in chemical engineering, integrating design into introductory circuits courses in electrical engineering, and creating a national faculty development workshop at Penn State.

Mitchell replaces Thomas A. Litzinger, professor of mechanical engineering, who was appointed director of the Leonhard Center for the Enhancement of Engineering Education in July.

Dr. Mitchell can be reached at (814) 865-2359 or by e-mail at jdm4@psu.edu.
Chemical Engineering receives $5 million gift

The College of Engineering has received $5 million from a donor who wishes to remain anonymous. The gift will endow the Department of Chemical Engineering and significantly strengthen its interdisciplinary activities in the life sciences—particularly in the bioprocessing and biomedical areas.

“The discipline of chemical engineering is in transition today,” said Larry Duda, head of chemical engineering. “Recently, tremendous strides have been made in understanding biological systems, and chemical engineers will play a dominant role in transferring these new biological discoveries to industry during the next century—just as they did with the petroleum industry in the past. We are elated that the resources from this endowment will move our department into this area much more quickly than we had anticipated.”

The gift will support the trend of science’s greatest advances occurring at the borders between different disciplines, noted University President Graham Spanier.

“As we prepare for the forthcoming capital campaign, notable gifts such as this will inspire others to help us achieve our goal of significantly increasing Penn State’s endowment, and we are extremely grateful for such generous support,” Spanier said. Income from the endowment will fund a faculty chair for a senior professor to provide leadership for the new thrust, undergraduate scholarships, and fellowships for graduate students pursuing biological and biomedical research. The endowment will also enable an annual lecture series featuring renowned experts in the chemical engineering/life sciences interface, and laboratories and equipment to support new research and instructional activities.

“Having the chemical engineering department receive such a magnificent endowment at this time of pivotal change in the field is wonderful,” said Engineering Dean David N. Wormley. “This will strengthen the department’s undergraduate and graduate curricula and research programs, and help prepare our graduates for the future.

“The high quality of the department’s faculty and programs was instrumental in our donor’s decision to make this significant gift to our College,” Wormley added. “We are thankful for our donor’s generous support and confidence in the chemical engineering department. With this endowment, the department has the potential to advance significantly in this interdisciplinary field.”

Retirement won’t keep West away

Harry H. West, professor of civil engineering, has retired after thirty-nine years of dedicated service to the College of Engineering.

“When classes started this fall, it felt like the boat was leaving without me,” West said about his retirement. “Retirement can be the right thing to do, but you can still miss your work.” West will continue to do what he loves most—teaching—and has returned to the classroom this semester to teach a new Science, Technology and Society course. In addition, he’s continuing to participate in a program he initiated—the College’s Faculty Mentoring Program for Teaching—as well as writing a new textbook on matrix methods and structural analysis for upper-level students.

During his career which began at Penn State in 1958, West accumulated an impressive list of awards, including the University-wide 1990 Christian R. and Mary F. Lindback Award for distinguished undergraduate teaching and the 1996 Alumni Teaching Fellow Award. In 1993 he was honored with the College’s Lawrence J. Perez Memorial Student Advocate Award as well. His research has dealt with static and dynamic analysis of suspension bridges and other cable-supported bridge and roof structures, temperature effects in multistory steel frames and prestressed concrete segmental box girder bridges.

Except for a combined period of five years in the Air Force and at the University of Illinois as a graduate student, his entire career has been involved in teaching and structural research at Penn State.
Engineering Campaign Committee announced

Eighteen engineering alumni have agreed to help the College of Engineering in the University's upcoming capital campaign. These engineers and business leaders from fifteen geographical regions across the country will assist the College in securing major gift support during the campaign.

Though a specific dollar goal and timetable have not yet been established, the coming campaign will focus on increasing endowment support for: faculty chairs and professorships, graduate fellowships, undergraduate scholarships, and college program support. We are very appreciative of our dedicated volunteers, who will be invaluable in this challenge.

Chair:
James E. Marley, Aero ’57
Chairman, AMP, Inc.
Harrisburg, PA

Honorary Chair:
William E. Leonhard, EE ’36, ’40 (MS)
Retired Chairman, Parsons Corporation, State College, PA

Members:
Ardell Anderson, Aero ’64
Senior Vice President, Pratt & Whitney
East Hartford, CT

Thomas A. Bathgate, ArchE ’70
President, Pennell & Wiltberger
Philadelphia, PA

Fred Breidenbach, IE ’68
Former President, Gulfstream Aerospace, Bluffton, SC

Michael A. Brunner, IE ’55
Retired President, AT&T Federal Systems, Potomac, MD

Harvey F. Brush, ChemE ’42
Retired Executive Vice President,
Bechtel, Atherton, CA

Frank Gabron, ME ’55 (MS)
Retired Chairman, Helix Corporation
Hollis, NH

R. William Happel, IE ’69
Vice President and General Manager
Electro-Motive Division, General Motors Corp., LaGrange, IL

George W. Johnston, SE ’60
President and CEO, American Water Works Co. Inc., Voorhees, NJ

William Keefauver, EE ’48
Retired Corporate Vice President/Legal, AT&T, New Vernon, NJ

E. Niles Kenyon, Aero ’64
President, The Conair Group
Pittsburgh, PA

William B. Korb Jr., IE ’62
President and CEO, Gilbarco Inc.
Greensboro, NC

Bennett Levin, IE ’65
Former Commissioner of Licenses & Inspections, City of Philadelphia
Philadelphia, PA

Kenneth Moffitt, IE ’55
Vice President and General Manager,
Ingersoll-Rand Company
Garland, TX

William Ramsey, IE ’78
Vice President, Compaq Computer
Houston, TX

Walter Robb, ChemE ’48
Vantage Management
Schenectady, NY

Charles Schneider, ME ’62
President and CEO, U.S. Security Associates, Inc., Atlanta, GA

Engineering dean wins ASME award

Dean David N. Wormley has been awarded the 1997 Dynamic Systems and Control Division (DSCD) Education Award by the American Society of Mechanical Engineers (ASME). The award is given for his continuing contributions to dynamic systems and control education.

“Dean Wormley has been a primary member of the DSCD for the last thirty years and has actively contributed to the growth of the division,” said ME professor Asok Ray, who nominated Wormley.

Wormley’s achievements include developing undergraduate and graduate courses in which unified modeling techniques for mechanical, electrical, thermal, and fluid systems are used along with simulation and control. In particular, he’s helped integrate modeling simulation and modern state space analysis and design techniques into a cohesive set of materials. Wormley co-authored a textbook on the subject, “System Dynamics: An Introduction,” adopted by universities in the United States, Canada, and abroad.

Wormley, who became Penn State’s engineering dean in 1992, has contributed significantly to engineering at a national level during his career. He served as associate editor for the Journal of Engineering Education, as chair for the advisory committee for the National Science Foundation Engineering Directorate, and as a member of the educational advisory committee for the National Society of Professional Engineers.

This year, Wormley is chair of the executive committee of the National Research Council’s Transportation Research Board. This board coordinates transportation research funded by individual states to focus research on critical issues and emphasize application of the results.

In addition to the DSCD Education Award, Wormley has been honored with the Lewis Moody Award from ASME, a NASA Certificate of Recognition, and as an ASME Fellow.
Irene Johnston Petrick has been named the director of industrial relations for the College of Engineering. She will be working out of the College’s Office of Graduate Studies and Research.

She is responsible for coordinating the College’s relationship with industry partners and her responsibilities include promoting College research and related facilities, helping faculty members locate funding opportunities, writing proposals, and negotiating contracts and agreements.

“If we had a major emphasis, it would be developing long-term partnerships with companies,” she said. “These longer-term relationships allow faculty the opportunity to get more deeply involved in both problem solving and future planning. This is especially important for the College of Engineering where applied research and development activities are a major backbone of the University’s education, research, and service mission.”

According to Irene, industrial partnerships are becoming more common as universities seek ways to offset declining federal funding while companies search for ways to augment shrinking research and development capabilities.

“By developing long-term partnerships with companies, we’re trying to bring some continuity to their efforts and to offer exciting opportunities for our faculty and students to work on important industrial problems,” she said.

Such partnerships will give students access to state-of-the-art technology, facilities, and ideas. Research opportunities with industry partners will help students develop problem-solving and critical-thinking skills, as well as teach them how to adapt to an environment with constantly changing technology.

Irene holds a Ph.D. in engineering science and technology management from Penn State and also earned her M.S. and B.S. in economics from Penn State. She has taught a number of courses and seminars on the graduate and undergraduate level, including an annual graduate seminar in strategic technology management.

Dr. Petrick can be reached at (814) 865-1804 or e-mail ijpdo@engr.psu.edu.

Penn State’s College of Engineering mourned the passing of two faculty members last year.

Karl Kunz, professor of electrical engineering, died on November 19, 1997. Kunz served as head of the Electrical Engineering Department from 1986 to 1989 and specialized in computational engineering. During his tenure at the University, Kunz received the Penn State Engineering Society’s (PSES) Outstanding Teaching Award and coauthored the text Finite Difference Time Domain Method for Electromagnetics.

Robert M. Owens, professor of computer science and engineering, passed away on Sep. 13, 1997. Before joining the University in 1980, he worked for the Naval Surface Weapons Center and IBM. Author of more than 125 publications, Owens served on the Very Large Scale Integrated (VLSI) technical committee of the Institute of Electrical and Electronic Engineers (IEEE) Signal Processing Society and on the editorial board of the Journal of VLSI Signal Processing.

Penn State’s Radiation Science and Engineering Center has a new director, C. Frederick Sears (Nuc PhD ’69), who will oversee the research and teaching there, as well as making certain that the facility meets all operating and safety regulations.

Fred has extensive experience in industrial reactors and environmental engineering, and prior to his appointment at Penn State was an independent nuclear consultant specializing in management, operations, engineering and safety of nuclear reactors.

Fred began his career with Penn State at the Breazeale Reactor, and then joined Combustion Engineering in 1968. He was a captain in the U.S. Army Engineer Reactor Group, serving as assistant branch chief and qualifying as officer in charge for operation of the Army’s reactor.

In 1980, Fred became director, nuclear engineering at Northeast Utilities. He was appointed vice president, nuclear and environmental engineering, in 1983; and vice president, environmental in 1992. In 1994, he became a private consultant.

He earned a B.S. in physics and M.S. in nuclear science and engineering from the Virginia Polytechnic Institute, and his Ph.D. in nuclear engineering from Penn State in 1969. Fred completed the executive management program at the Edison Electric Institute in 1987 and the Advanced Management Program at the Harvard School of Business in 1992.

Dr. Sears may be reached at (814) 865-6351.
President’s Perspective
by Susan Schall

1998 promises to be a year of change and accomplishment for PSES.

One major change involves meeting times for the Board of Directors and committees. In January, the Board met on a Friday afternoon and the committees convened on Saturday.

The primary reason for this format change is to allow alumni who are interested in becoming actively involved with PSES, but cannot take a weekday off from work or home commitments, to participate on campus. We will continue this format through 1998.

Check the PSES WEB page at http://www.engr.psu.edu/www/coe/alumni for spring and fall meeting dates. If you can attend the Saturday committee meetings, contact Cindy Jones and she will give you more information. Remember, the committees include: student recruitment; alumni on-line; special events (including the Golf Classic); co-op assistance; and department affiliate groups.

I am proud to announce a major accomplishment for PSES. Proceeds from the 1996 and 1997 Golf Classics have totaled in excess of $25,000, sufficient funding to endow the PSES Undergraduate Student Scholarship. Congratulations to Will Kresge (EE ’66), Chair of the Special Events Committee, and Farley Pechatka (SCI ’83), Golf Classic Chair.

Co-op Corner
Co-op Student of the Year

Congratulations to Jeanette Rivera, who became the third recipient of The James M. Slick Engineering Co-op Student of the Year Award.

Rivera, a senior Industrial Engineering student from Guaynabo, Puerto Rico, performed two co-op rotations at Ethicon, Johnson and Johnson, located in Puerto Rico.

In their nomination, Ethicon praised Rivera for her diligent work and vibrant personality. She proved to be a highly motivated and resourceful member of the Ethicon team. Within a short period of time, Rivera became instrumental in the development and implementation of a business snapshot system that was quickly adopted by several other departments. While at Ethicon, she received a company Rainbow Award for her efforts as the key contributor of a Packaging Profile for her unit, which led to a company-wide savings of over $1 million.

As Co-op Student of the Year, Rivera received a $1,000 scholarship from the Engineering Co-op Office. The announcement of her award was made at the Career Days 1997 Employer Luncheon held at the Bryce Jordan Center.
The PSES Board—up close and personal

Priscilla E. Guthrie ’71 electrical engineering
Priscilla enrolled at Penn State as a foreign language major, but against the advice of her Penn State adviser, switched to electrical engineering. She went on to earn an M.B.A. from Marymount College and has spent her professional career with TRW, Inc., managing systems engineering and integration, and strategic and tactical planning.

Recently, she established The Priscilla E. Guthrie Scholarship in Electrical Engineering. This is the first undergraduate scholarship endowment solely funded by an alumna of the College of Engineering.

Priscilla joined the PSES Board of Directors in 1995 and is a member of the Co-op Assistance Committee. In any spare time she can find, Priscilla enjoys golf and sports car racing (she used to race, and is a spectator now).

Willard G. Kresge ’66 electrical engineering
Will became an active member of PSES in 1991 as a member of the Student Recruitment Committee. In 1993, he chaired the Development Committee and in 1995 became the chair of the Special Events/Member-ship Committee.

Following his graduation from Penn State, Will worked for UGI Corporation, an electric utility company. He then founded Utility Engineers, Inc., a consulting engineering firm, which merged into Quad Three Group, Inc. Today, Kresge is Senior Vice President of the Wilkes-Barre, PA, company which provides architectural, engineering, and environmental science services for commercial, industrial and governmental institutions.

Will is an avid Penn State football fan, a golfer, and frequent traveler on his Harley-Davidson.

Both of these EE grads have interests in fast machines—something they learned at Penn State?

5th Annual Golf Classic

When the early morning fog lifted, the sky looked blue, the sun felt warm and the 100+ golfers on the Blue Course had a great time! Congratulations to the team winners: Emory Enscore (IE MS ’67, PhD ’72), William Enscore (COM ’97), Bruce West (IE MS ’67), and Brad West (HHD ’95).

After the barbecue lunch, the raffle winners were announced, the prizes awarded, and the proceeds tallied. We are delighted to report that the combined total of contributions to the 1996 and 1997 Golf Classics has surpassed the minimum required ($25,000) to endow an undergraduate engineering scholarship. The PSES Undergraduate Student Scholarship will be awarded to a deserving engineering student beginning with the Fall 1998 semester.

Thanks to all the golfing participants, the thirteen hole sponsors (especially Platinum Sponsor, Quad Three Group, Inc. and Gold Sponsor, PWI Engineering), the twenty-five local business and University contributors, three special contributions from friends of the College, and the volunteers who worked so hard to make it such a perfect outing.

The 6th Annual PSES Golf Classic, which will be held on Saturday, September 26, 1998 at the Penn State Blue Course, will continue to support the scholarship endowment so that we may increase the number of scholarships and award amounts. Please plan to join other alumni, faculty, staff, students, and friends of the College of Engineering for a good cause and a great time!

1998 Alumni Calendar of Events

March 9-13 Penn State Spring Break
April 4 Engineering Prospective Student Open House
April 5-6 Outstanding Engineering Alumni Awards
April 15-16 Leonhard Center Advisory Board
April 17 Engineering Campaign Committee (Toftrees)
April 25 Blue/White Football Game
April 30 College Faculty/Staff Awards Ceremony
May 16 College of Engineering Commencement
June 4-8 Traditional Penn State Alumni Reunions
July 8-12 Central PA Festival of the Arts
August 8 Summer Commencement
September 25-26 PSES Fall Meeting and Golf Classic
Engineering alumni fellows

The Penn State Alumni Association selected two engineering graduates as 1997 Alumni Fellows. Henry R. Barracano (EE ’48), retired assistant to the senior vice president of engineering construction for the Arabian American Oil Company (ARAMCO), and John B. Nelson (IE ’55), retired senior vice president of LaSalle Partners in Washington, D.C., were presented with the awards by University President Graham Spanier in November.

Known as Hank, Henry Barracano has more than forty years’ experience in energy-related project management and construction. As an engineer and consultant, he directed major projects involving power systems, infrastructure, pipelines, and offshore platforms throughout the world. At ARAMCO for twenty-seven years, he was involved in planning the company’s capital program, developing infrastructure, and providing basic oversight of oil production. He retired in 1983 as assistant to the senior vice president for engineering and construction, and has been an independent consultant.

Hank is a senior member of the Institute of Electrical and Electronics Engineers and a member of the Petroleum Club of Houston. He holds memberships in the Society of Penn State Electrical Engineers (SPSEE), the President’s Club, and the Penn State Alumni Association.

John B. Nelson spent eighteen years working for major American corporations including Armstrong Cork, Reynolds Metals, and IBM after graduating from Penn State in 1955. In 1972, he joined LaSalle Partners, a real estate firm in Chicago. He opened the firm’s Washington, D.C., office to redesign and develop Union Station in 1979. By his retirement in 1990, he had become senior vice president and had helped the company grow to a firm that provides a full range of real estate, pension investment, and development services to corporations and institutions.

John is a former member of the development committee of PSES and holds memberships in the Penn State President’s Club and Alumni Association. In 1990, he and his wife, Catherine, with gifts matched by the McGraw Foundation, endowed the John B. and Catherine B. Nelson/McGraw Foundation Endowed Scholarship in Industrial Engineering. The scholarship recognizes outstanding undergraduate students in industrial engineering at Penn State.

Class Notes

1950s

The United Nations Environment Programme’s North American office in New York City has named Jon Plaut (IE ’57) as senior adviser. Plaut has worked closely with the UNEP Industry office in Paris for many years. He is a member of the NAFTA Joint Public Advisory Committee and a visiting lecturer or environmental policy at PSU. Plaut was director of Environmental Quality for Allied Signal, Inc. until his retirement in 1996.

James C. Wambold (ME ’59), professor emeritus of ME, received a 1997 American Society for Testing and Materials Award of Merit. The title of Fellow accompanies the award. Wambold was cited by ASTM standards-writing Committee E-17 on vehicle-pavement interface for outstanding contributions in the development of standards for pavement skid resistance and roughness measurement and leadership in Committee E-17. Organized in 1898, ASTM is one of the largest voluntary standards development systems in the world.

1960s

Benjamin A. Pontano (EE MS ’67, PhD ’70) was recently appointed president of COMSAT Laboratories. He previously served for eight years as vice president of the Network Technology Division. COMSAT Laboratories is the research and development division of COMSAT Corporation, which provides technology and products related to satellite communications.

Continued on next page
In February, 1897, the State Capitol of Pennsylvania was reduced to rubble by fire. In February 1997, Fire Protection Industries, Inc. of Bensalem, PA, was honored to participate in the commemorative program of the fire that gave birth to the current Capitol Complex. Ausmus Marburger (ArchE ’70), president of FPI, is pictured with the commemorative award and Robert Glenn, Department of General Services; Representative Paul Clymer, Chair of the Capitol Preservation Committee; and, Don Konkle, Fire Chief of the Harrisburg Fire Department.

On September 27, Richard S. Bloss (ME MS ’70) of Tenneco Packaging in Pittsford, NY, presented a $4,000 check to Dean Wormley and Assistant Dean for Student Services, Jean Landa Pytel. This Tenneco donation will be used for undergraduate student scholarships in Engineering. Bloss, recently elected to the PSES Board of Directors, has been active with the PSES Student Recruitment Committee for several years.

Jeffrey F. Lawrence (CE ’83 MEng Capital ’87) received an MBA from Mount Saint Mary’s College in Emmitsburg, MD. Recently joining STV Incorporated’s Baltimore office as a project manager in charge of traffic engineering projects, Lawrence resides in Cockeysville with his wife, Kristin.

Lt. Robert Meyer (NucE ’86) and Lt. Christopher Trost (NucE ’87) posed with JoePa following graduation ceremonies at MIT in June 1997. Both are engineering duty officers who were selected by the Navy to complete a three-year program in Naval Architecture and Marine Engineering. Lt. Meyer has been awarded the Navy Commendation Medal and Navy Achievement Medal. He is married to the former Heidi Class. They are the parents of six-year-old Kristin, and reside in Lexington, MA. Lt. Trost has been awarded the Navy Commendation Medal, Navy Achievement Medal and National Defense Service Medal. He is married to the former Gwyneth Baker (HHD ’88). They are the parents of six-year-old David and reside in Pomfret, CT.

Alan W. Hewston (Aero ’87) and his wife, Kathleen, celebrated the birth of their first child, Samantha Rose, on September 6. Hewston is a flight software engineer with NASA Lewis Research Center. The family lives in Parma Heights, OH.

Dave Hinko (Aero ’89) is senior project engineer with Allison Engine Company, a subsidiary of Rolls Royce. He resides in Indianapolis, IN.

SEND YOUR ALUMNI NOTES NOW!

“The Class Notes” is a regular feature of Penn State Engineering magazine. Please use the space below (or your own stationery) to send us news about you or your classmates. Tell us about promotions, honors, appointments or achievements. Photos, preferably black and white, are welcome. Return to Trish Long, Editor, Class Notes, The Pennsylvania State University, 101 Hammond Building, University Park, PA 16802, FAX 814-863-4749, E-mail PJLDO@engr.psu.edu.

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I want to receive information on how to join PSES.

Check here if this is a new address.

My latest news is:

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Civil engineering student dives into studies, university activities

The clock atop Old Main strikes half past five. Darkness falls on campus during a crisp autumn evening as people line the streets waiting for the Homecoming parade. At the parade’s staging area in the Flower Gardens, Erica VanTassel, a civil engineering senior and member of the homecoming court, anxiously waits for the procession to begin. For Erica, it is another highlight in her long, successful college career.

Twelve hours earlier, the clock atop Old Main strikes half past five. No floats, no bands, no spectators. Only a set of lonely bells that echo into the dark campus morning. It is hours before the start of the day’s first classes, but as most students remain asleep, Erica has already started her daily ritual with varsity swimming practice at McCoy Natatorium.

The intensity of Erica’s practice is matched only by the routine that follows and the vigor she tackles it with. Following practice, Erica heads off for a full day of classes. Her only breaks come when she is between classes, where she uses the time to study, or when she returns to the pool for her 2:30 practice. Erica stays on campus afterwards, having dinner at the Hetzel Union Building and studying more. She typically does not return to her apartment until 8 p.m.—more than fifteen hours later.

Some may call her daily routine intense or crazy, but Erica prefers to think of it as busy. “I’ve found that the busier I am, the more efficient I am,” said the Pittsburgh native. “I don’t know how I juggle it. I try to get enough sleep so I have enough energy in the day.”

In addition to her devotion to the women’s swim team, Erica has dedicated much of her time to learning civil engineering. She has worked as a co-op for Pitt-Des Moines in its engineering division doing computer programs and spreadsheets on tank designs. “I think I learned more that summer than my first two years of college,” she said.

Erica said one of her biggest accomplishments was designing a concrete wall to surround a tank that would contain spilling from the tank. Although Erica learned a great deal on her own, she found that her lack of field experience hindered her usefulness during a trip to a construction site. “I went to a construction site for a day to become familiar with work in the field,” she said. “The foreman gave me my first task: go to the local convenience store and get cold drinks for the guys. I was embarrassed and frustrated because I wanted to help with the construction project, but did not have any prior work experience in the field.”

That incident spurred Erica to focus on hands-on experiences so she would be prepared to meet future challenges in the field. “Some of the new engineers and I were given the day off to go over to the welding lab for a lesson. It was helpful because we designed the weld for tank construction, so we learned first-hand how to weld,” she said.

Erica brought that knowledge back, and as an intern for the Women in Engineering Program (WEP), helped organize machining seminars for women at The Learning Factory. “I think that kind of hands-on experience really helps,” she said. “As a result of participating in the machining courses, women are prepared for work in the field so that they will have confidence on their first day on the job.”

She credits her father, who is also an engineer, with encouraging her to try engineering before counting herself out. Erica, a member of Phi Eta Sigma honor society and a dean’s list student, said her father also told her not to worry about grades. “I look at grades as a letter. You’re in school to learn,” she said. “My dad always told me, ‘You’re learning, you’re not supposed to know everything yet.’ ”

As she looks forward to graduation, Erica said she hopes to enter the master’s program in environmental engineering at Penn State. She also hopes to continue her trips to the natatorium—as a swimming graduate assistant coach.

But that is all in the distant future for now as Erica and the rest of the homecoming court makes its way down College Avenue. It is a moment in time she will never forget—the cheers from the crowd, the music from the band, and the children waving.

“That was probably one of my greatest experiences at Penn State,” Erica said afterwards. “I really felt like I was part of the University.”

—Curtis Chan
At first glance, the 7th floor of Beaver Hall looks like an ordinary dormitory, filled with the typical trappings any student would own. Milk crates, posters, lofts, microfridges, and Christmas lights adorn each room with textbooks lining the shelves and class schedules hanging on the wall.

But this is no ordinary dorm. Construction paper cutouts shaped like sprockets display the names of a room’s occupants. Painted next to each door, the symbol for an element from the periodic table matching the room’s number.

This floor is the Engineering and Applied Science Interest (EASI) House, a co-ed special living option for engineering and science students. It is one of three engineering-related interest houses at Penn State. Interest housing, or theme housing, unites students with similar interests or backgrounds into a dormitory floor. Other houses include the First Year in Science and Engineering (FISE) House in Pennypacker Hall and the Women in Science and Engineering (WISE) House in Curtin Hall.

Linda Clark, assistant director of the University’s Science and Technology Diversity Initiatives, said the living options help students build a common bond outside of the classroom. “Interest houses are ways to get students involved with the University,” Clark said. “Programming is on 24 hours a day,” said Judi Wakhungu, director of the Women in the Science and Engineering Institute and advisor for WISE House. “Interest houses help reduce the attrition rate in students because it reduces the isolation students are feeling. It makes them think, ‘I’m not the only one.’”

Timing is critical in keeping new students at universities, said Gary Schwarzmueller, executive director of the Association of College and University Housing International, based in Columbus, OH. He said housing officials are becoming more aware of signs that students may be on the edge of leaving, such as homesickness and skipping of classes.

“Students may make the decision to leave in the first two weeks living at an institution. A high percentage of people who decide to quit often decide in the first two weeks that they don’t want to do this and leave. They show up as academic casualties,” Schwarzmueller said. “Interest housing is a response, especially at universities like Penn State and Ohio State where there is a large campus, for the need for community.

“Interest housing tunes into the special needs of students and meets those needs. It’s even become a recruiting tool. A student may decide on a particular school because it can provide a supportive environment.” Jeffrey Campbell, a sophomore in mechanical engineering, said he found the support he needed when he moved into FISE House as a freshman last fall.

“There were a lot of minorities in Pennypacker so you don’t feel isolated,” said the Baltimore, MD, native. “I come from a large city and going to a predominantly white university, this made the transition more comfortable.”

More than just a shared living space, each interest house provides residents with a network of academic and social support systems. FISE House and WISE House have program assistants (PAs) living on the floor, who are upper level students serving as activity coordinators, tutors, mentors, and friends. Activities the PAs plan include academic help sessions, corporate visits, plant tours, dining with faculty, and social events.

WISE residents, for example, have traveled to conferences, dined with industry representatives, attended workshops on interview skills, job hunting, and networking. Wakhungu said a favorite program among residents is in-house tutoring.
Interest house living isn’t all work and no play—FISE House residents enjoy an afternoon picnic.

Caroline Miller, a program assistant for WISE House and a sophomore in microbiology, said she enjoys the convenience offered by the in-house tutors, especially on days when the weather outside is less than friendly. “I go down in my pajamas now—it’s great,” she laughed. “You know the tutors because the study groups are so small.”

But it’s not all work and no play for interest house residents. Social activities sponsored by the houses include pizza parties, trips, formals, and tailgating for football games. Members of EASI House, for example, threw a picnic in a nearby park to kick off the school year, while WISE House residents can go to a “football buddies” board to find someone to go with to football games.

“For the incoming freshmen, it’s a great place to be,” said Nathan Brough, an industrial engineering junior and vice president of EASI House. “Most of the people are willing to talk to you. It’s a great base to start from.”

“Everyone was going through the same thing; you could go down the hall and knock on the door for help with school work,” said Valarie Tuck, an aerospace engineering sophomore and former resident of FISE House. Tuck, who lives in McKean Hall this year, said she misses the community feel of FISE House. “I wish I could pick all the people I lived with last year and move them all into my dorm. It’s not the same this year, everyone’s spread apart.”

Others share Tuck’s desire to live in interest housing. In fact, the demand for the interest houses is so high that people have been turned away or placed on waiting lists. At FISE House, for example, Clark said 300 students applied for 144 available slots. Wakhungu said WISE House is hoping to expand, as it turns away more students than it accepts. Also, Jason Checque, president of EASI House, said more than thirty-two people are on the house’s waiting list.

“I’ve been trying to get on the floor since my freshman year, and I finally did—as an RA,” said Debbie Faust, EASI House’s resident assistant and a senior in chemical engineering.

Piping in with a floor testimonial, Jennifer Stefanik, a senior in chemical engineering, said, “Everyone knows each other, everyone helps each other. We’ve got study buddies because we stay up late doing homework.”

Added Faust: “There’s always the stigma that engineers aren’t fun and we fight that by doing a lot of fun things together. Because we have very similar interests, we do a lot more together. It’s easy because people want to do it. There are no strange faces.”

There is a small area in the middle of EASI House its residents affectionately refer to as “the cave.” Equipped as a resource room with a computer, exam files, books, and drafting tables, the room’s walls have been painted by past generations of house residents. Scrawled with signatures from years gone by, a single sentence reflects the pride those residents took in the house that today’s residents continue:

“The coolest floor ever.” —Curtis Chan
Penn State’s College of Engineering sponsors a number of camps and workshops during the summer for high school students who may be interested in learning more about engineering. The following are some of the programs set for summer 1998:

**VEC-Tour (Venture in Engineering Camp)**—June 14-20; June 21-27; July 5-11; July 12-18; July 19-25; July 26-Aug. 1

Week-long camp introduces high school students to the fundamentals of engineering with information sessions and activities, as well as social events. For information, contact the VEC-Tour staff at (814) 865-4018 or check out their web site at [http://eec.psu.edu/1c/vec-tour/](http://eec.psu.edu/1c/vec-tour/).

**SOARS (Special Opportunities and Research for Space)**—June 21-July 3

High school juniors and seniors participate in NASA-related research on the Penn State campus. For information, contact Geraldine Russell at (814) 863-7688 or e-mail at gsr1@psu.edu.

**WISE Week (Women In Science and Engineering)**—July 19-25

Female high school juniors and seniors explore science and engineering fields through hands-on workshops. For information, contact Katie Rung at (814) 865-3342 or e-mail at cxg1@psu.edu.

Summer Minority Programs

Additional information about the following programs can be found on the Web at [http://www.engr.psu.edu/mep/](http://www.engr.psu.edu/mep/), by calling Saundra Johnson at (814) 865-7138, or by e-mail at mep@engr.psu.edu.

**VIEW (Visit In Engineering Week)**—July 12-18; July 19-25; Aug. 2-8

Students of color entering their senior year of high school can get involved with hands-on design activities with Penn State faculty members and students during this week-long engineering program.

**BEST Scholars Program (Business, Engineering, Science & Technology)**—July 11-Aug. 8

A four-week academic enrichment and career awareness activity for students of color entering 12th grade who are interested in pursuing careers in business, engineering, or the sciences. Participants can explore educational opportunities at Penn State and career opportunities with Eastman Kodak Company. Students must be residents of Pennsylvania or New York to apply.

**CURO (Center for Undergraduate Research Opportunities)**—June 6-Aug. 7

Undergraduate students of color from any university will have the opportunity to participate in research in laboratories and centers on the Penn State campus.
As we consider the practice of engineering over the past few years and view the new millennium, it is clear that technology will play an even greater role in our lives and in engineering education than it has in the past.

For the general public, technological advances are providing new jobs, communications and information access on a global scale, and improvements to health and the quality of life. For engineers, new technology provides important information and support in design, analysis, experimentation, and production; and in developing efficient and effective practices. And for educators, changing technology is affecting the content and delivery of our engineering curricula and the facilities needed to provide the best education for our students.

In addition to changes in technology itself. Instruction is more interactive. Faculty are using computers, e-mail, and the Internet in courses. Classrooms are changing, with two-way video and computer-controlled presentations available as resources.

A number of initiatives in the College are changing the educational experiences of our students to reflect these rapid changes in technology (see story on page 12). These new opportunities will provide our students with improved insights and understanding of fundamental engineering knowledge and processes.

A rapid prototyping machine in operation at The Learning Factory allows students to construct complex three-dimensional parts directly from CAD drawings. Students with experience in this technology gain valuable insights concerning the coupling of design and construction and are in considerable demand by industry.

A new laboratory in the Department of Mechanical Engineering integrates computer-aided experimentation, data processing, data analysis, and presentation. This laboratory provides a resource for students ranging from freshmen to seniors who can conduct experiments to gain a deeper understanding of the complex processes that occur in many of the fluid and thermal disciplines.

The College also recently completed a computer-based classroom with two-way video that allows students to directly communicate not only with a professor here at Penn State, but also for example, with a practicing engineer on a factory floor in southeastern Pennsylvania. With the two-way video audio link, students can ask questions of an experienced engineer who can provide insights into issues related to production and manufacturing.

Similarly, new technology helped us develop collaborative relations with other universities in the U.S. and abroad, so students can learn from different cultural approaches to product development. During fall semester, for instance, our first-year students in several sections of Engineering Design and Graphics 100 were teamed with French students via the two-way video for a student project.

We have been extremely fortunate to have alumni and industrial partners working closely with us on these and similar initiatives. Their advice has been invaluable and their generous support has made a difference to our students.

Technological change also has an impact on our College’s buildings and facilities. Not only must equipment be upgraded, but the classrooms themselves have new requirements—from changed seating and lab table alterations to installing new wiring and computer network connections.

The College recently received wonderful news from the Commonwealth of Pennsylvania, in support of two new facilities which will help us further utilize technology in engineering education: Bids for two new academic buildings were accepted and construction on these buildings, which are featured on the back cover of this issue, will start in the spring.

The Leonhard Building will house the Department of Industrial and Manufacturing Engineering, and provides an opportunity to develop manufacturing laboratories which will substantially enhance the educational experience of our students. The manufacturing and systems laboratories will be fully integrated with communications and computational technologies and will be the centerpiece of the first floor of the new building. The laboratories will be visible from all floors of the building, thus providing an integrated teaching and research experience for students and faculty.

The second building, which is shared jointly with the College of Earth and Mineral Sciences, will be the new home of the College’s Engineering Science and Mechanics Department. The building will also feature a multimedia classroom to allow us to teach our students using the full range of modern information and communication technologies.

Thus, as we approach the new millennium, information and communication technologies will play an even greater role in the education of engineers. We believe the technology-based initiatives in engineering education that the College has begun indicate a very strong and viable future for engineering education. Its relevance as an integral ingredient in the health and welfare of the nation is unquestionable.
University’s five-year construction plan includes engineering buildings

The University recently announced a new partnership with the Commonwealth of Pennsylvania that puts capital funding for Penn State on a regular five-year basis. The first five-year construction plan includes two new engineering buildings, pictured here, to be built on the West Campus.

The West Campus area is located between North Atherton Street and the University Golf Course, and behind the Garfield Water Tunnel. Renovations to Sackett Building and the engineering units are also part of the five-year plan, and scheduled for 2001-2.

The Leonhard Building (top) is named in honor of alumnus William E. (EE ’36) and Wyllis Leonhard, who are long term supporters of the College. Additional information on these buildings can be found inside the back cover, in Dean Wormley’s column.